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Simulation of electron acceleration by Alfvén waves in the lower solar corona

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Inertial Alfvén waves have been proposed to accelerate electrons in the low solar corona where they might cause hard X ray radiation during solar flare [Fletcher & Hudson 2008, ApJ, 675, 1645]. Due to their short transverse wave length inertial Alfvén waves carry a longitudinal electric field parallel to the background magnetic field. This longitudinal field can, in principle, reflect and accelerate electrons to velocities in excess of Alfvén wave velocity, i.e. to energies of the order of tens of keV.
For this study an electromagnetic two-dimensional particle-in-cell simulation (2D EM PIC) code is used to verify the proposed electron acceleration mechanism in the plasma of the lower corona. To generate an incoming Alfvén wave, an antenna is placed at one boundary that generates sinusoidal oscillating perpendicular electric fields. The dispersion relations of the excited plasma waves and the response of the electrons in their velocities are discussed in this work.